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THE CRUISE OF THE PETREL

BY HERBERT N. LOWE

(Continued from page 76)

Our next anchorage was off the lagoon on the south end of San José Island, the home of the pearl fishers. On the flats across from the lagoon channel we noticed a canoe with three natives busily gathering something edible. These proved to be *Strombus granulatus* Gray which were spawning here by the hundred. The fishermen preferred them to any bivalves, and carried away several sacks full. We tried them for dinner that evening and found them quite palatable.

On the sand bars at the mouth of the estuary where the current ran swiftest, I took a fine lot of *Cardium biangulatum* Sby. and two species of *Glycimeris*. On another bar were many fine *Cardium consors* Sby. and *Arca multicostrata* Sby. At our anchorage on the north end of San José Island I took my first pairs of *Glycimeris gigantea* Rve. and *Crassatellites undata* Sby., also two more fine *Pitar pollicaris* Cpr. and some excellent pairs of *Venus subimbricata* Sby. This species, while not uncommon as odd valves, is exceedingly rare in perfect pairs.

Next day we made a stormy run to San Diego Island and then to Santa Cruz Island where we anchored for the night. A few hours north of here we came to the lovely island of Santa Catalina where I had excellent luck in collecting *Bulimulus johnsoni* Hanna, living under rock slides on the north side of the main canyon. A few *Bulimulus slevini* Hanna were taken on Monserrate Island and *Bulimulus santacruzensis* Hanna on Santa Cruz Island. On Danzante Island and at Puerto Escondido just opposite on the peninsula I

took some living specimens of *Bulimulus lamellifer* Pils.; *Coelocentrum insulare* Hanna I took on Danzante Island and *Coelocentrum vanduzeei* Hanna at Puerto Escondido in company with the rare and interesting *Berendtia taylori* (Pfr.)

The mountains a few miles back from Puerto Escondido towered precipitously some five thousand feet in a most spectacular manner. Especially under the early morning or late afternoon light the wonderful stratification was very clear in all its colors, much like the Grand Canyon of Arizona.

Continuing north we reached Carmen Island, where under rock slides another *Bulimulus* was taken, *B. ximenez* Hanna. In a haul with the tangle in fifteen fathoms in Salinas Bay we took our first living *Spondylus pictorum* in company with *Arca pacifica* Sby. and *Ostrea megodon* Hanley, all wonderfully fine specimens.

At low tide I took my first living *Heliacus variegatum* Lam. feeding among a short olive-green ascidian which covered the rocks in places. The spirally elevated operculum of this species is exceedingly interesting. In company with them were a few *Cuma costata* Blv. On Coronado or San Ildefonso Island we took no land shells but on Tortuga I collected *Bulimulus dentifer* Mabilie under blocks of black lava not far from the crater's rim.

From here we had a pleasant eight hour run across to Guaymas where we arrived December 22, in time for the port officials to enter us before five P. M. The following day while the yacht was being refueled, watered, and provisioned we tried our luck on the low tide at "Miramar" on the outer coast. Here we took *Arca illota* Sby., *Fusinus cinereus* Rve., *Crassispira nymphaca* Pilsbry and Lowe under rocks, and on the mossy surface of some large boulders were *Trivia solandri* Gray feeding on sea lettuce.

The following morning we had our clearance papers and went up the coast as far as San Carlos Bay where we worked the afternoon tides with tolerable results. One live *Lyrria cumingii* Brod., *Conus regularis* Sby., *Murex bicolor* Val., *Murex radix* Lam., *Turritella goniostoma* Val., *Polynices*, and olivas were in the catch.

Christmas day was spent in a small cove opposite San Pedro Nolasco Island, and early the next morning we started on our long run to Tiburon Island. We arrived after a cold, windy day at seven P. M. at Pelican Island just off Kino Bay. At the time of our visit the miserable remnants of the two tribes of Seri Indians which had inhabited Tiburon Island from earliest history where on the mainland opposite, fishing for Tortuava.

The chief, Chico Romero, and his family came out to look us over and beg for something to eat. We satisfied them with bread, cookies, oranges, cigarettes, and a can of coffee. Later in the day we moved over to the anchorage just off the hunting lodge and went ashore for the afternoon tide. The sand beach well rewarded us with many uncommon species of bivalves in pairs at the high tide line. *Cancellaria cassidiformis* Sby. and *Crassispira bottae* Val. were among the rare gasteropods taken.

On a small mud bar in the estuary I found a fine large species of *Lithophagus* which I had never seen before. A notable feature of the mollusk fauna of the Gulf region is the number of species which are the largest of their genus. I have measured the following species from my collection which will give some idea of their huge size. Needless to say there are many others a fraction of an inch larger.

<i>Metis alta</i> Conr.	3 $\frac{5}{8}$ inches
<i>Dosinia ponderosa</i> Gray	4 $\frac{7}{8}$ inches
<i>Glycimeris gigantea</i> Sby.	3 $\frac{1}{4}$ inches
<i>Cardium elatum</i> Sby.	5 $\frac{1}{2}$ inches
<i>Chione gnidia</i> Brod. & Sby.	3 $\frac{7}{8}$ inches
<i>Arca grandis</i> Sby.	5 $\frac{5}{8}$ inches
<i>Dolium ringens</i> Swns.	8 inches
<i>Patella mexicana</i> Brod. & Sby.	8 $\frac{1}{2}$ inches
<i>Melongena patula</i> Brod.	7 $\frac{1}{2}$ inches

Our huge Pinna, Spondylus, Murex and Fasciolaria run a close second place. Altogether this region has more species of huge size than any other part of the world of equal area. The close similarity between many of the Gulf of California

and Gulf of Mexico species has been noted many times by previous writers. A number of species seemingly impossible to distinguish from those of the South sea fauna also crop up in our molluscan lists from the Mexican West Coast.

Most prominent is *Coraliophila madreporarum* Sby. which I have taken from the Tres Marias Island and south to San Juan del Sur, Nicaragua. I have also taken *Cypraea isabella mexicana* Stearns from Tres Marias. I have two badly worn but unmistakable specimens of *Voluta ancilla* Sby. and *Voluta deshayesi* Rve. from Clipperton Island. On this present trip I found on San José Island a good beach specimen of the rare *Cassis vibex mexicana* Stearns, only reported twice previously.

Cypraea caput-serpentis L. is reported by the St. George Expedition as being dredged off Coiba Island, Panama. Stearns reports *Thais hippocastaneum* and *Murex palmarosae mexicana* Stearns from the Gulf and there are many other records of South sea species, or local forms of them, in the literature from this province.

The next five days were spent on Tiburon Island with rather poor results as the tides were not so good. At our anchorage in Fresh-water Bay on the north coast of the island the first specimens of the beautiful and fragile *Acmaea dalliana* Pils. made their appearance. This species seems to be restricted to the upper part of the Gulf only. We did not find it on the south coast of Tiburon Island. With them were the largest and finest colored *Acanthochitona exquisita* Pils. taken on the entire trip.

At Tepoca Bay on the mainland across from the north end of Tiburon Island we found another small tribe of Seri who visited us the following day. I literally traded the shirt off my back for a couple of their baskets, and one squaw wore it much to the envy of her sisters. They live in miserable brush hogans which give little protection from the cold winds.

After an all night run across the Gulf we reached Animas Bay on the peninsula. Even with a very low tide we found this a poor place for molluscs but very rich in three species of large sand dollars and the immense twenty-rayed star fish

which were feeding on *Crucibulum spinosum* Sby. The two tides spent at Angeles Bay were not much better as far as molluscs were concerned. At the head of the bay are miles of forest of the giant cactus. On many of the islands also are marvelous specimens of these giant forms.

The north end of Angel de la Gardia Island, our next stop, seems to be the type locality of *Acmaea dalliana* Pils. We took some fine ones here along with many Chitons and a large colony of *Cypraea annettae* Dall. At the south end of the same island a large school of *Pecten excavatus* Anton had been thrown up by a southeast gale on the boulder strewn beach. I have never taken this or *Pecten subnodosus* Sby. alive except with the dredge or tangle.

A little way south we stopped at Raza, a small but most interesting island, as it has been the breeding grounds of the Heerman Gull for untold generations and has for many years been the resort of the egg gatherers and guano hunters from Guaymas. The stones have been cleared from the ground and piled in long walls to give the birds better nesting places and render the guano more accessible. From the water these walls look much like the ruins of some prehistoric civilization. A day each was spent on San Lorenzo and San Esteban Islands.

At the latter island, where we lay at anchor sheltered from the northwest wind, without any warning a fresh current from the opposite direction took the yacht almost aground on the rocks, and but for prompt action of all on board serious damage might have resulted. As it was we bumped two rocks. The tides have a tremendous rise and fall in this part of the Gulf and strong currents run around the islands which with the prevailing swell and the heavy and sudden winds make the Gulf at times a very treacherous body of water. At the north end of Angel de la Guardia we came in at high tide over a place which a few hours later showed a black ugly reef. The upper part of the Gulf is one of the most desolate and lonely spots in the world. The islands are waterless and uninhabited, and the coast line of both sides is practically so. We passed but one boat of any de-

scription in all the three weeks we were there. San Pedro Martir, a small rock mass lying in lonely isolation in the middle of the Gulf was our next stop.

Its sheer black walls rose perpendicular over a thousand feet to its flat summit crowned with a forest of giant cactus. Every ledge in the sheer cliff was white with guano from the thousands of sea birds which breed here every year. At only one spot on the island is it possible to land and that only in calm weather. Thousands of sea lions came out to greet us and barked a noisy welcome.

We made Guaymas early the next morning where we took on oil, water and provisions for the return voyage. Clearing at noon the day after, we spent the afternoon in dredging in fifteen to twenty fathoms outside the bay with passable results.

That night we crossed the Gulf and lay at anchor two days in the lee of San Marcos Island; as the northwest winds were still strong. A few *Bulimulus* were collected here but the live shells were very scarce. After a rough three-hour run we anchored in Coyote Cove on the west side of Concepcion Bay. Here we passed two of the most perfect days on our whole trip; not a breath of air stirred, and the water was so clear that objects at a three foot depth were plainly visible.

The number of species in the tidal zone of Concepcion Bay was not very great, but the forms were very abundant. At no other place on either side of the Gulf did we take *Arca pacifica* Sby. living between tides, but here they were very large and abundant; most of them, however, were very badly covered with foreign growth. The natives gather them for food as well as the large *Strombus galeatus*. The *Murex bicolor* Val. were much in evidence feeding on *Macrocallista squalida* Sby. Sometimes as many as fourteen would be gathered around awaiting the demise of a single unfortunate clam. They don't drill the shells like the Naticas but merely envelope the clam with their foot until it succumbs from suffocation or starvation; when the whole hungry herd proceeds to the feast.

Some good living *Dosinia ponderosa* Gray and *Glycimeris*

gigantea Rve. were taken on the sand flats along with quantities of *Chiones*.

A second stop was made at the lower end of the bay opposite the large lagoon. Plowing around in the soft mud were a goodly number of *Lyria (Enaeta) cumingii* Brod. the first I had taken alive except an occasional specimen. They seem to prefer sandy mud at or below extreme low water. Heretofore I had taken single living specimens at La Paz, Tiburon Island, and San Carlos Bay, and hermit crab specimens at several other localities.

At Concepcion Bay I took a large *Chama* which I did not find living at any other station; most of the huge specimens were simply riddled with worm holes making them almost unfit as specimens. Unlike most *Chamas* they were but slightly attached.

A second landing was made on Carmen Island and Ensenada de los Muertos and then a straight run to the Revillagigedo Islands. Our first anchorage was on the south side of Socorro Island where some good *Chitons* and *Acmaea* were taken, also *Thais planispira* Lam. and the largest *Turbo fluctuosus* Wood I have ever seen were here in abundance. I had never taken but two live *Thais planispira* Lam. previously in four years; so I was delighted with thirty good examples.

Socorro, while not given over greatly to cactus, is so densely covered with brush as high as a man's head that traveling is very slow. The dense brush made the wool crop so unproductive that the sheep company had to give up their island holdings.

After a brief stop at San Benedicto Island we set our course northward for the San Benitos Islands where we anchored after a long four days' trip out of sight of land all the way. I put in my time here collecting *Micarionta pandorae* Fbs. under rocks and agaves and was rewarded with a wonderful color series.

From here we made a straight run for Ensenada and home to San Pedro after just ten weeks on the water.